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Project Summary

Maintenance Dredging at
ConocoPhillips Portland Terminal Marine Dock

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Project Location and Background

ConocoPhillips Company (ConocoPhillips) proposes to conduct maintenance dredging along its 640-foot-long marine dock at the Portland Terminal (terminal). This Portland Terminal is located in the Portland Harbor area of the Willamette River at river mile 7.8 (Figure 1). The site is accessed from Doane Avenue, just off of NW St. Helen's Road (U.S. Route 30) to the south and NW Front Avenue to the north (Figure 2). The Portland Terminal is a bulk storage and distribution facility for finished petroleum products and lubricant oils. ConocoPhillips has operated its upland bulk storage and distribution facility since 1908. The marine dock was originally constructed during the 1920s or early 1930s. In 1959, the dock was reconstructed to its current condition and capacity.

The Portland Terminal's marine dock is located northeast of Tank Farm 2, across Front Avenue, and is equipped with vessel loading/unloading and tug fueling stations. The vessel loading/unloading station is located near the center of the dock and is used to load and/or unload gasoline, diesel, heating oil, black oil, and lube oils. The in-water portion of the dock consists of a combination of steel and treated wood timber piles. The above-water portion of the dock consists of a combination of concrete (around fuel transfer equipment) and treated wood. Vessels currently calling at the dock are primarily barges, although transfers from tankers and ships are occasionally conducted if sufficient draft is available. The tug fueling station is located near the end of the dock and is used to fuel tugs with diesel and supply tugs with lube oils.

All product transfers are conducted using flexible cargo hoses between the vessels and the piping risers at the loading/unloading station. The risers are connected to the storage tanks within the tank farms through a combination of above and below ground piping. Flexible hoses on reels with dispenser nozzles are used to transfer diesel and lube oil at the fueling station. Transfers to the terminal are conducted using pumps on-board the tanker or barge; whereas transfers to barges are conducted using the terminal's pumps.

Similar facilities are located in the immediate area. Chevron and Kinder Morgan operate petroleum bulk storage and distribution facilities downstream of the project site and use docks adjacent to the ConocoPhillips dock. McCall Oil and Shell Oil operate bulk petroleum storage and transfer facilities located upstream from the project site.

In 1984 and 1997, ConocoPhillips, or its predecessors, obtained maintenance dredge permits to maintain ship berthing areas along its Portland Terminal dock. We understand that these dock berths were last dredged in the mid 1980s. The previous permits allowed mechanical dredging to a design depth of -40 feet CRD. Maintenance dredging, conducted by others, occurs north and west of the project site to maintain the Willamette River navigational channel and berths at the adjacent Chevron dock. Vessels routinely dock at both the ConocoPhillips dock and the adjacent Chevron dock (Figure 3).

The U.S. Army Corps of Engineers (USACE) plans to deepen the existing -40-foot navigation channel located just beyond the Portland Terminal to -43 feet Columbia River Datum (CRD), thus enabling the use of larger, more efficient vessels to transport commodities. Because of concerns about sediment in the lower Willamette River, any deepening of the 11.6-mile Willamette navigation channel will be undertaken by USACE in conjunction with the Willamette River's Portland Harbor Sediment Superfund environmental cleanup.

Project Purpose and Need

The purpose of the project is to restore and maintain operationally functional water depths at the Portland Terminal's two berths (referred to as the 'up-river' and 'down-river' berths). Maintenance dredging is required to facilitate the safe and efficient berthing of vessels that currently use the dock and to facilitate future use by the newer, deeper-draft generations of vessels now in service, as is intended by and consistent with the USACE Channel Deepening Project.

The marine loading/unloading dock is a vital part of ConocoPhillips operations. Currently, product is delivered to the Portland Terminal via the Olympic Pipeline, marine vessels, and railcar. There is insufficient infrastructure surrounding the terminal to deliver products by rail; therefore, it is necessary that the berths facilitate marine vessels so that more than one avenue is available for getting product into the Portland Terminal. For instance, specific product such as Black Oil is solely dependent on barge transportation.

Figures 3 and 4 describe current bathymetry in the vicinity of the Portland Terminal's marine dock. The Willamette River and the ConocoPhillips marine dock structure can support vessels with up to a 36-foot draft carrying a load of about 35,000 dead weight tons, or about 280,000 barrels. The current water depth available for the down-river berth is about 28.5 feet, and the vessels calling are almost exclusively barges with a maximum capacity of 150,000 barrels and a draw of 27.5 feet. The current water depth available at the up-river berth is only 20 feet. This means that during lower water periods (i.e., when the river elevation is below +9.0) approximately twice as many vessels have to moor and transfer product on a daily basis than is desired. In addition to higher operational costs, the additional moorage increases potential damage to the dock, as well as the risk of a petroleum spill during product transfer.

Water depth at the Portland Terminal's marine depth has been lost over the years through ongoing sediment deposition. A review of historical bathymetric data indicates that portions of the Portland Terminal's berthing areas are losing water depth at a rate of approximately 0.5 feet per year. Without dredging, products typically transferred at the dock will not be able to be brought to market because of the physical limitations caused by accumulated sediments. Commerce at the Portland Terminal will further decline if larger vessels expected at the dock in the future cannot be accommodated; thereby affecting fuel supplies in Portland. ConocoPhillips is currently permitting the restoration of its dock piles and seeks to begin this construction in 2009 or 2010, at the latest. The dredging would need to occur immediately following the dock restoration work.

Overview of Project Area Conditions

Condition of bank slopes. The banks of the Willamette River in the vicinity of the ConocoPhillips Portland Terminal are heavily industrialized, with much of the bank hardened with riprap, vertical concrete walls, and docking facilities. Much of the historic off-channel habitat has been lost due to diking and filling of connected channels and wetlands (Willamette Riverbank Design Notebook 2001).

Type and condition of riparian vegetation. There is very little riparian vegetation in the action area, and the riparian zone is not functioning properly due to heavy industrial development. Limited opportunity exists for large wood recruitment to the lower Willamette River due to the lack of relief and mature trees along the shoreline to catch and hold the material.

Channel morphology. The Portland Harbor area can be characterized as the upper estuary of a major Columbia River tributary. There is a fairly steep drop-off within 100 to 200 feet from the shore to a flat bottom. Much of the historic off-channel habitat has been lost due to diking and filling of connected channels and wetlands (Willamette Riverbank Design Notebook 2001). Near the site, the Willamette River is approximately 1,600 feet wide, with average flow rates ranging between 8,300 cubic feet per second (cfs) during summer to 73,000 cfs during winter.

Stream Substrate. The river at mile marker 7.8 has a soft sediment bottom with little or no aquatic vegetation.

In 1997, the Oregon Department of Environmental Quality (DEQ) and the U.S. Environmental Protection Agency (EPA) took sediment samples within the Portland Harbor. The results of the study indicated that sediments in the harbor, including within the project area, contain concentrations of metals, polychlorinated biphenyls (PCBs), pesticides, herbicides, dioxins/furans, tributyltin (TBT), and polycyclic aromatic hydrocarbons (PAHs) above Portland Harbor Joint Source Control Strategy (JSCS) screening levels. Remedial investigation and feasibility study of the contaminated sediments are presently being addressed under the Federal Superfund process (Portland Harbor Sediment Management Plan 1999).

Since the late 1990s, numerous surface and near-surface sediment samples have been collected by the Lower Willamette Group (LWG) within and adjacent to the project limits as part of the Portland Harbor Superfund Site remedial investigation. On the down-river side of the dock, two shallow sediment samples (W09APG and W09CPG) have been collected within the desired dredge depth, and two sediment cores (DMMU1 and DMMU2) with depth-discrete samples have been collected through and below the desired dredge depth. On the up-river side, one sample (ST014) appears to have been collected within the desired dredge depth, and one sediment core (C532) with depth-discrete samples has been collected through and below the desired dredge depth (Figure 4).

In general, PAHs were detected on the up-river side of the dock, but did not exceed the minimum JSCS screening values. Pesticides (4,4-DDD, 4,4-DDE, 4,4-DDT), lead, and mercury were detected above the JSCS screening criteria on both sides of the dock through the dredge depth and at the proposed newly exposed surface depth. PAHs and metals were not tested in sediment samples collected from representative cores completed on the down-river side of the dock. A summary of existing physical and chemical analytical sediment sample data collected within the last 5 years in the proposed dredge prism is provided in Tables 1 and 2.

Fish and wildlife. Because the Willamette River is tidally influenced, both freshwater and brackish water species may be present. Chinook salmon, steelhead trout, coho salmon, chum salmon, American shad, and white sturgeon occur in the area. Cutthroat trout are also present, but their abundance is low. Both juveniles and adults use the project area as a migratory corridor and as rearing habitat for juveniles.

Conditions for ESA-listed species are described in two NMFS Biological Opinions for ConocoPhillips Company projects in the action area, one for the Piling Replacement Project (NMFS 2008) and the other for the Fender Pile Maintenance of Structures in Portland Harbor (NMFS 2004). Consultation will also be conducted for the proposed dredge maintenance project.

Because of the heavy industrialized nature of this reach of river, avian wildlife is limited to waterfowl, crows, pigeons and perhaps overflights or limited duration visits of bald eagles and other raptors. Small mammals, such as mice, rats, muskrats, and river otters may be present in the general area.

General hydrological conditions. The natural hydrograph of the Willamette River is highly modified. Water levels throughout the river and its tributaries are regulated by the 13 USACE dams situated along the river. Most of the rainfall occurs in the fall, winter, and spring, with little rainfall during June, July, and August. The lowest river flow occurs during late summer.

Existing Outfalls. Three of the four stormwater outfalls within the project limits (Figure 2) are owned by ConocoPhillips. They range in size from 3 to 4 inches diameter and are constructed of PVC material. ConocoPhillips maintains a Spill Prevention Control and Countermeasure Plan per the Clean Water Act, an Emergency Response Plan per the Oil Pollution Act of 1990, and a combined Stormwater Pollution Control Plan/Accidental Spill Prevention Plan, as required by its NPDES and wastewater discharge permits for the facility. The fourth outfall is owned by the City of Portland. The City outfall is listed as a 60-inch-diameter, stormwater-only outfall, constructed of corrugated steel pipe.

Project Description

ConocoPhillips considered a range of project alternatives based on the project purpose and need. Alternatives considered included alternative site locations, project scale, and construction methodologies.

ConocoPhillips is presently evaluating two possible maintenance dredging options. Both options are designed to restore the dock to its current and anticipated needs (i.e., -37 feet on the down-river berth and -30 on the up-river berth). One option is to dredge the down-river berth (presently at -28.5 feet) to -37 feet and the up-river berth (presently at -20 feet) to -30 feet without capping newly-exposed sediments with clean imported sand. The second is to over-dredge the down-river berth by 3 feet (total depth of -40 feet) and the up-river berth by 3 feet (total depth of -33 feet) to accommodate a sediment cap. The purpose of the sand cap material would be to prevent aquatic organisms from direct contact with potentially contaminated newly-exposed sediments. The applicant anticipates that a cap would facilitate a streamlined permitting process since it would directly address potential concerns related to the release of pollutants from newly-exposed sediment.

Dredging for either option would be performed to the desired depth plus 2 feet, as is typical for dredging contracts to ensure the desired depth is achieved. Side slopes would be dredged at a ratio of 3:H to 1:V. The lateral extent of dredging the down-river and up-river berths to -39 and -32 feet CRD, respectively, is illustrated in Figure 3 and 4. If capping is selected, we anticipate that the imported sand would be placed at a thickness of 6 to 12 inches over the entire dredge prism (side slopes and base), not to exceed the minimum dredge elevation. The need for armoring material is not anticipated, since the natural hydraulic and physical environments (e.g., currents, wave energy, outfall discharge, etc.) are expected to be low. Also, erosive energies from motor propelled vessels can be mitigated through operational best management practices (e.g., restricting maximum speed and placement of warning buoys). To ensure the integrity of the cap, it would be monitored every two years using single beam bathymetric surveys and diver inspections.

Grain-size distribution data collected from sediment cores completed the entire dredge prism indicate that the sediment to be removed is comprised of coarse and fine-grained material. Near-shore sediment to be dredged consists of 1 to 8 feet of silty sand overlying 5 to 7 feet of silt with sand. Off-shore sediment to be dredged generally consists 1 to 6 feet of silt with sand. A conceptual cross-section of sediment lithology within the dredge prism along the up-river berth is illustrated in Figure 5.

The applicant proposes dredging the Portland Terminal's marine dock site with a cable arm bucket. In the event materials are compacted beyond the capabilities of the cable arm, a clam shell bucket would be used. Approximately 1,500 to 1,750 cubic yards would be removed daily at 8 to 12 hour shifts. The estimated total volume to be removed is 23,600 cubic yards in the event ConocoPhillips dredges the up-river and down-river berths to -32 and -39 CRD, respectively. Dredging would be performed between the minimum and maximum dredge depth tolerance. To ensure this range is met, a pre-dredge survey would be conducted and downloaded onto the contractor's Global Positioning System (GPS). The operator would follow the contours of the minimum and maximum depths while dredging.

Dredge material would be loaded onto flat deck barges. Excess dredged water would either be decanted through scuppers at all four corners of the barge or be contained for treatment and disposal, if required. If the barge can decant at the site, water would go through straw wattles, bio bags, and filter fabric at the scuppers. If the water is to be contained, other disposal alternatives would have to be evaluated in consultation with the agencies. Dewatered dredge materials would be transported by barge and disposed at an approved upland transfer facility.

Once the dock site is dredged to the desired depths, maintenance dredging would be performed as needed. Therefore, disturbance to the cap from prop wash, wave action and future pile removal and/or driving is expected to be minimal.

The following list of best management practices would be used during construction by the dredging contractor:

- Dredge passes shall proceed from the head of the slip towards the mouth.
- The contractor will begin dredging at the highest elevation and work toward the lowest elevation.
- The contractor will not be allowed excavate beyond the maximum depth (i.e., "glory holing would not be allowed").

- Overfilling of the bucket will not be allowed.
- The contractor will pause the dredge bucket as it breaks the surface of the water and allow the bucket to drain free water prior to swinging and placing dredge material on the haul barge.
- No bottom stockpiling or multiple bites of the clamshell bucket will be allowed.
- The contractor will seal off barge scuppers on haul barges and repair any holes in fences to prevent water or sediment from draining off haul barge, if required.
- Barges will not be overfilled.
- No grounding of construction barges will be allowed.
- Over-dredging at the base of a slope will not occur.
- Dragging of the dredged surface to lever the mud-line will not be allowed.

Project Alternatives Considered and Dismissed

Alternative Site Locations

No alternative site locations have been considered since no other sites would fulfill the project purpose and need.

Alternative Project Scale

Beyond the potential placement of clean imported sand above the newly-exposed sediment layer, the project scale is simply designed to restore and maintain dock operations to a fully functional capacity. Prior dredge permits authorized sediment removal by clamshell bucket to a design depth of -40 feet CRD. For this application, ConocoPhillips has reduced the scale of the project to coincide with current and reasonably anticipated needs to dredge to a design depth of -37 and -30 feet CRD (plus the typical 2-foot overdredge) or an additional 3-foot overdredge if a sediment cap is constructed.

Alternative Dredge Methods

Hydraulic dredging was also considered but dismissed from further consideration for a variety of reasons. Mechanical dredging is a more cost effective method and reduces the amount of water requiring surface management and disposal. There are no appropriate upland staging areas near the project site to safely dewater the hydraulic dredge slurry. The risk of an accidental discharge to the Willamette River during dredging and dewatering is too high to justify the hydraulic dredging. There is a long precedence in the project vicinity for safely using cable arm and clamshell bucket dredging for projects similar to the one proposed by ConocoPhillips.